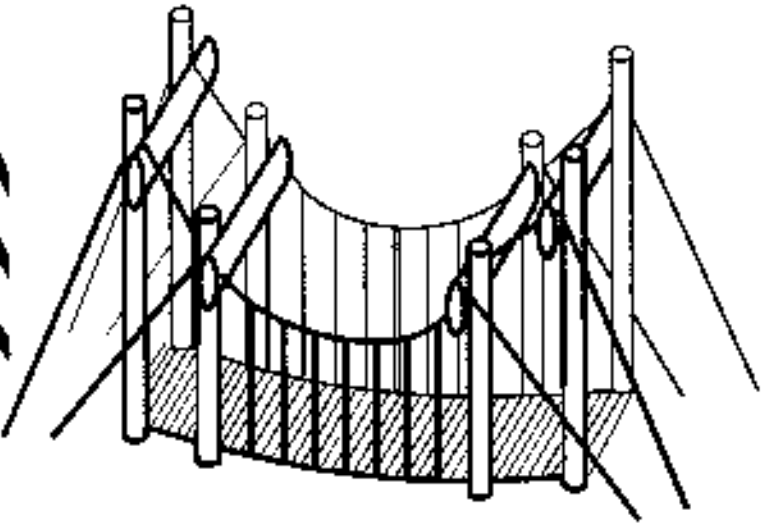
SUSPENSION BRIDGE



1. When people walk across the bridge, do they generally produce traveling waves or standing waves? Explain your answer.

2. What happens when you "pump" up and down on a plank at the center of the bridge?

3. As you pump up and down on a center plank, are there any points on the bridge that don't move at all? Where are they located?

4. If a person pumps energy into the center of the bridge by moving up and down in resonance with the bridge, a standing wave may be produced. Sketch the standing wave produced in the situation described in question 2.

5. Now move to a point half way between the center and end of the bridge. Pump up and down and observe the shape of the bridge. In the space below, draw a sketch of the bridge as you observed it.

6. Points that do not move on a vibrating object are called *nodes*. Label the nodes in the sketches you drew in questions 4 and 5.

7. Points that move the most dramatically are called *anti-nodes*. Label the anti-nodes in the sketches you drew in question 4 and 5.

8. Describe the location of two permanent nodes on the suspension bridge.

9. What would you have to pump up and down on the suspension bridge to produce a standing wave with a total of four nodes (this includes the nodes at the ends)?

10. Using a stopwatch and measuring tape, determine the frequency and wavelength of the standing wave produced in question 2.

frequency = _____ wavelength = _____

11. From the data obtained in question 10, compute the speed of the wave through the bridge.

12. Using a stopwatch and measuring tape, determine the frequency and wavelength of the standing wave produced in question 5.

    frequency = _____ wavelength = _____

13. From the data obtained in question 12, once again determine the speed of the wave through the bridge.

14. From your answers to questions 11 and 13, how does the speed of the wave depend on the frequency of the wave?